Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Experimental two-point microrheology of two-dimensional systems VIKRAM PRASAD, ERIC WEEKS, Emory University — Microrheology is often used to determine the bulk viscoelasticity of materials such as polymer solutions, by tracking the diffusion of tracer particles. For heterogeneous materials, where single particle microrheology breaks down, a modified technique known as two-point microrheology has been established where motions of particles with varying spatial separations are correlated. In 3-d systems, this correlated motion decays as 1/R, and can be used to identify the long wavelength modes in the system, and therefore the bulk viscoelasticity. For 2-d systems, theory has predicted a logarithmic decay, but to date, this prediction has gone untested. We look at the correlated motions of colloidal particles in two types of quasi 2-d systems (protein molecules at an air-water interface, and thin soap films), and observe a transition from 3-d to 2-d, by continuously varying the Boussinesq number, $B_0 = (\eta_s/\eta a)$ from 0 to ∞ , where η_s is the surface viscosity, η is the bulk viscosity, and a is the size of the colloidal particle. The experimental results are compared to theory, and consequences for microrheology at interfaces are discussed.

Vikram Prasad

Date submitted: 28 Nov 2005 Electronic form version 1.4